Performance Tested Comfort Systems®
Heat Pump Commissioning and Duct Sealing Program Requirements

Introduction

This document sets forth the minimum program requirements for trainers and trainings, technicians and installations, and quality assurance delivered in connection with the Performance Tested Comfort Systems program. For BPA utilities, the program requirements outlined here replace the PTCS Provider Standards issued by the Regional Technical Forum.

1. **Training Requirements**
2. **Technician Requirements**
3. **Utility Requirements**
4. **Quality Assurance**

1. Training Requirements

1.1. Minimum Trainer Qualifications – PTCS Trainers shall meet the following minimum standards:

1.1.1. Duct Sealing trainers shall have a minimum two (2) years full time experience (or demonstrated equivalent) in the following: duct system testing and remediation and combustion zone depressurization testing, or conducting quality assurance inspections for duct tightness programs using these tests.

1.1.2. Heat Pump Commissioning trainers shall have a minimum two (2) years full time experience (or demonstrated equivalent) in the following: testing heat pump auxiliary heat controls, indoor coil airflow, sizing and refrigerant charge.

1.1.3. All trainers shall use BPA-provided or BPA-approved training materials.

1.2. Training Requirements – Approved PTCS training shall include core competency areas listed below and at the end of training(s) the PTCS technician shall be able to complete program installation form(s) completely, comply with program quality assurance requirements, pass a BPA-provided written test with a score not less than 80%, and meet all other requirements for the specific training.

1.2.1. **PTCS New Duct System Trainings** shall be a minimum of one (1) day, and trainee shall demonstrate competency in accurately capturing and recording of measurements, responding to quality inspection issues and using testing protocols to conduct 1) a Total duct leakage test, 2) a Duct leakage to outside test, and 3) a Combustion appliance zone (CAZ) depressurization test.

1.2.2. **PTCS New and Retrofit Duct Systems Trainings** shall be a minimum of three (3) days, include all components of 1.2.1, and trainee shall demonstrate a working knowledge of duct sealing and testing for new and existing homes; and a thorough understanding of the program requirements for new and existing homes with particular regard to the state and utility service area(s) in which the technician is working.

1.2.3. **PTCS Heat Pump Trainings** shall be a minimum of one (1) day, and trainee shall demonstrate understanding of auxiliary heat control requirements, airflow testing using approved methods, sizing and refrigerant charge methods;

1.2.4. **PTCS Inspector Trainings** may be provided in a classroom, in the field and/or using an online format, depending on the inspector's experience. Inspector shall demonstrate an understanding of all PTCS quality assurance and documentation requirements.

1.2.5. Trainers shall provide students with dated proof of training completion after they have demonstrated mastery of the subject.

1.2.6. Trainers will confirm an individual's training completion status to BPA and/or BPA utilities upon request.

2. Technician Requirements

2.1. Technician must sign a participation agreement with BPA and be approved prior to installing PTCS measures.

2.2. Technician shall possess dated proof of successful PTCS training completion.

2.3. Technicians are responsible for maintaining current knowledge of PTCS technical standards and program requirements.
2.4. New Technicians shall give each utility for which they install measures advance notice of their schedule at least one week in advance for PTCS projects until the first three have been observed and/or inspected by the utility. The utility and/or BPA may require additional inspections if the first three projects are not in compliance with program requirements.
2.5. Technician shall respond promptly and correctly to data input issues and quality assurance (QA) inspections.

3. Utility Requirements

Any utility offering PTCS heat pump commissioning and/or duct sealing measures shall:

3.1. Verify that the technicians in their programs have been trained and certified in the measures they install and maintain their knowledge of program requirements;
3.2. Conduct quality control on data for PTCS projects to ensure accuracy and completeness;
~~**3.3.** Ensure that quality assurance inspections are conducted as outlined in Section 4 of this document;~~
~~3.4.~~**3.3.** Work with BPA to prepare and carry out audits of action plans for technicians having difficulty complying with program specifications, when requested by BPA.

4. Quality Assurance

4.1. Inspection Staff shall have the following qualifications:
4.1.1. Duct System inspections:
4.1.1.1. Testing and/or co-testing at least 30 systems, with at least 15 of those being retrofit projects
4.1.1.2. Possess proof of successful PTCS training completion in new and retrofit duct systems
4.1.2. Heat Pump Commissioning inspections
4.1.2.1. Commissioning and/or Co-commissioning at least 30 certified systems;
4.1.2.2. Possess proof of successful PTCS training completion in heat pump commissioning
4.1.3. For all inspection types, the inspector shall have an acceptable QA history for jobs they have installed, as determined by BPA.
4.2. QA shall be performed by a BPA-approved Quality Assurance inspector at a rate of 10% of all projects per program year.
4.2.1. Inspections counting toward this total shall first include new technician inspections and action plan inspections, with the remainder of the requirement being generated with projects selected randomly from a pool of projects conducted in the specific program year. Re-inspections of sites previously inspected and found to require corrective action do not count towards the total.
4.2.2. In homes where there are circumstances which do not allow for timely and/or accurate testing, the auditor may elect to test a different job installed by the same contractor.
4.2.3. Utilities, governmental agencies and system benefits administrators may contract for third party Quality Assurance services.
4.2.4. Inspections for a specific program year must be completed within 3 months of the end of the specific program year.
4.2.5. Inspections may be pooled at a collaborative level, with BPA approval.
4.3. Certified Technicians may not conduct quality assurance inspections in a territory where they install PTCS measures.
4.4. The Quality Assurance inspector shall have the responsibility to: (1) fail any system that it finds does not meet PTCS specifications adopted by BPA at the time of installation; (2) to report that failure to program, utility and contractor; (3) to identify corrective actions required to bring substandard systems up to measure specifications; (4) to support BPA audits of prior QA inspections as requested.
4.5. *Timeliness:* For quality assurance to be most effective, a QA inspection should be done within 90 days or, in new homes, before owner occupies the home.
4.6. In the case of new technicians, quality assurance inspector shall observe and/or inspect at least the first three installations by new technicians.

4.7. If a contractor is found to repeatedly submit inaccurate data, training may need to be scheduled, or a stricter approach may be taken to encourage the development of better practices.

4.8. Duct Sealing Quality Assurance Inspections shall follow the procedure outlined in this section

4.8.1. Homes using the percent of floor ratio path

4.8.1.1. Will be designated as "Pass" if:

4.8.1.1.1. The QA test finds results within tolerances (6% new construction; 10% existing homes) and therefore in full compliance **AND**

4.8.1.1.2. Visual inspection shows that high pressure areas have been sealed (air handler, supply, plenum, and take-offs). Physical items to check: UL-181 Mastic is applied according to manufacturer's specifications, Straps are used if needed, no ducts are disconnected, and no tape used on the system except UL 181 tape on the access cover only.

4.8.1.2. Will be designated as "Pass" *after* a phone call to the contractor if:

4.8.1.2.1. The QA test finds up to 20% more than maximum allowed, OR 40 CFM above maximum allowed, whichever is lower.

4.8.1.2.2. The phone call will serve to cover the areas where improvement could be made by the contractor, yet it would avoid the costs incurred by having a call back. It is ideal at this time to arrange for the contractor to call the QA inspector before going to do next job, so that education on these items can be done in a 'hands on' manner.

4.8.1.3. "Fail" if it does not meet either of the above criteria. The contractor will have to go back out to the jobsite and perform the required corrections.

4.8.2. Homes using the 50% leakage reduction path will be designated as passing if:

4.8.2.1. For duct systems below 400cfm @50PA post test leakage to outside, QA test results do not exceed 130% over the number reported; or, for duct systems exceeding 400cfm post-test leakage, QA test results do not exceed 125 CFM over number reported, **AND**

4.8.2.2. Visual inspection shows that all accessible high pressure areas have been sealed (air handler, supply, plenum, and take-offs). This includes UL-181 Mastic applied according to manufacturer's specifications, straps used wherever needed, no tape used on the system except UL 181 tape on the access cover only, and no disconnected ducts.

4.8.3. Homes inspected using Supply Side Only testing (where return air ducts are inaccessible and/or not reasonably correctable) shall be designated as passing if: a supply side test shows no more than 40 CFM leakage over 10% of floor area or a 50% reduction of pre-test leakage, whichever is less.

4.8.4. Duct Accessibility*:* The following guidelines can be used to determine if a system is accessible or not, and to determine if the contractor put forth a good faith effort to seal the system. These guidelines are to be followed if the post-test leakage numbers are NOT met, and the question has become "Has the contractor done everything reasonably possible to seal the system?"

4.8.4.1. Accessibility does not require drywall patching.

4.8.4.2. Accessibility does not fail to consider pressure boundary manipulation (bringing ducts within pressure boundaries of the house)

4.8.4.3. Reasonable physical accessibility to duct in question is required.

4.8.4.4. Accessibility does not include destruction of non-discolored duct insulation.

4.9. Heat Pump Commissioning Inspection procedures verify:

4.9.1. Airflow measurement above 325 CFM/Ton (this allows for testing equipment error rate). CFM/ton may be lower if recommended by heat pump manufacturer.

4.9.2. Auxiliary heat settings are set to only come on at or below 35° or in normal (no defrost) operation. If the minimum setting available for auxiliary cutout on the indoor thermostat is 40F, 40F may be used.

4.9.3. Compressor lockout set no higher than 0° or as low as possible, if installed.

4.9.4. Refrigerant charge, using the minimum expected temperature split method and/or verification of compliance with manufacturer requirements for lineset length and ounces of refrigerant added.

4.9.5. Correct heat loss calculations and proper equipment sizing. Improper sizing will not lead to a failed job, but will trigger a corrective action plan.